

03 Sep 2017

Project: **Marsh Creek Flood Mitigation**

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Total Benefits: **\$464,653**

Total Costs: **\$188,654**

BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

**Project Summary:**

Project Number:

Disaster #:

Program:

Agency:

Analyst:

Discount Rate: 0.070

Point of Contact:

Phone Number:

Address: California

Email:

Comments:

**Structure Summary For:**

DFA\_Equip shed, California, , Contra Costa

Structure Type: Building

Historic Building: No

Contact:

Benefits: \$1,853

Costs: \$2,000

BCR: 0.93

Mitigation	Hazard	BCR	Benefits	Costs
Elevation	Damage-Frequency Assessment	0.93	\$1,853	\$2,000

Sunset Rd Fire Station, , , California, 94513, Contra Costa

Structure Type: Building

Historic Building: No

Contact:

Benefits: \$462,800

Costs: \$186,654

BCR: 2.48

Mitigation	Hazard	BCR	Benefits	Costs
Elevation	Flood	2.48	\$462,800	\$186,654

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Total Benefits: **\$464,653**

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Project Number:

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

**Structure and Mitigation Details For:** DFA\_Equip shed, California, , Contra Costa

Benefits: \$1,853

Costs: \$2,000

BCR: .93

Hazard: **Damage-Frequency Assessment - Flood**

Mitigation Option: Elevation

Latitude:

Longitude:

Project Useful Life: 25

### Mitigation Information

Basis of Damages: Historical Damages

Number of Estimated Damage Events: 3

Number of Events with Know Recurrence  
Intervals: 0

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Agency:

State: **California**

Point of Contact:

Analyst:

**Historic Damages Before and After Mitigation**

Analysis Year: 2017

Analysis Duration: 18

Utilities (\$/day):

Year Built: 2000

User Input Analysis Duration:

Buildings (\$/day):

Roads/Bridges (\$/day):

**Damages Before Mitigation**

Damage Year: 2002

RI:

Are Damages In Current Dollars? No

Buildings (Days):

Utilities (Days):

Roads (Days):

damages (\$)	\$0
Total	\$0
Total Inflated	\$0

**Damages After Mitigation**

RI: 700.00

Are Damages In Current Dollars? Yes

Buildings (Days):

Utilities (Days):

Roads (Days):

damages (\$)	\$2,000
Total	\$2,000

**Volunteers Cost**

Number of Volunteers Required:

Cost of Volunteers Time (\$/Hour/Person):

Per-Person Cost of Lodging for a Volunteer:

Number of Hours Volunteered/Person:

Number of Days Lodging/Volunteer:

Cost of Volunteers:

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State: **California**

Point of Contact:

Analyst:

Damage Year: 2010

RI:

Are Damages In Current Dollars? No

Buildings (Days):

Utilities (Days):

Roads (Days):

damages (\$)	\$500
Total	\$500
Total Inflated	\$596

**Volunteers Cost**

Number of Volunteers Required:

Cost of Volunteers Time (\$/Hour/Person):

Per-Person Cost of Lodging for a Volunteer:

Number of Hours Volunteered/Person:

Number of Days Lodging/Volunteer:

Cost of Volunteers:

Damage Year: 2017

RI:

Are Damages In Current Dollars? No

Buildings (Days):

Utilities (Days):

Roads (Days):

damages (\$)	\$2,000
Total	\$2,000
Total Inflated	\$2,000

**Volunteers Cost**

Number of Volunteers Required:

Cost of Volunteers Time (\$/Hour/Person):

Per-Person Cost of Lodging for a Volunteer:

Number of Hours Volunteered/Person:

Number of Days Lodging/Volunteer:

Cost of Volunteers:

**Social Benefits**

**Mental Stress and Anxiety**

**Lost Productivity**

Number of Person: 0

Number of Worker: 0

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Total Costs: **\$188,654**

BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

Treatment Costs per person: \$2,443.00

Productivity Loss per person: \$8,736.00

Total Mental Stress and Anxiety Cost: \$0.00

Total Lost Productivity Cost: \$0.00

**BCR Calculation Results**

Expected Annual Damages Before Mitigation

Expected Annual Damages After Mitigation

Expected Avoided Damages After Mitigation (Benefits)

Annual:	\$162
Present Value:	\$1,888

Annual:	\$3
Present Value:	\$35

Annual:	\$159
Present Value:	\$1,853

Mitigation Benefits: \$1,853

Mitigation Costs: \$2,000

Benefits Minus Costs: (\$147)

Benefit-Cost Ratio: 0.93

**Cost Estimate**

Project Useful Life (years): 25

Construction Type:

Mitigation Project Cost: \$2,000

Detailed Scope of Work: Yes

Annual Project Maintenance Cost: \$0

Detailed Estimate for Entire Project: Yes

Final Mitigation Project Cost: \$2,000

Years of Maintenance: 25

Cost Basis Year:

Present Worth of Annual Maintenance Costs: \$0

Construction Start Year:

Estimate Reflects Current Prices: No

Construction End Year:

Project Escalation:

**Justification/Attachments**

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

<b>Field</b>	<b>Description</b>	<b>Attachments</b>
Annual Project Maintenance Cost	no maintenance to keep equipment located in station	
Historic damages before mitigation	shed has flooded 3 times in past. 2002 no damages, 2010 had to replace some equipment, 2017 much of the equipment was ruined and had to be replaced. Please see attached receipts for costs to replace equipment	
Mitigation Project Cost	to move the equipment and demolish the shed	

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Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

**Structure and Mitigation Details For:** Sunset Rd Fire Station, , , California, 94513, Contra Costa

Benefits: \$462,800

Costs: \$186,654

BCR: 2.48

Hazard: **Flood**

Mitigation Option: Elevation

Latitude:

Longitude:

Size of Building: 8,700

BRV (\$/sf): \$150.00

Total BRV: \$1,305,000

Residential: No

Building Type:

Obstruction: N/A

Foundation Type:

Basement:

Building Primary Use: Protective Services

Structure Type: Engineered

Historic Building: No

Structure Elevation: 58.50

First Floor Being Raised: 2.00

Demolition Threshold: 50.00%

Source of Flood Data: FIS and HH

Project in SFHA: Yes

Community ID Number: 0

Effective FIS Date: 03/21/2017

FIRM Panel Number: 0

FIRM Effective Date: 08/31/2017

Project Useful Life: 25

H&H Study Title:

H&H Effective Date: 08/31/2017

Flood Zone: Unknown

Loss of Rent:

Building Contents: \$900,450 (Default)

Value of Crawlspace Contents:

Ground Surface Elevation:

Flood Zone Determination:

Breaking Wave Height:

Utilities that are not elevated: No

Height FFE Above Grade:

One Time Displacement Costs: \$0

NFIP: No

Displacement Costs: \$0

ICC: No

**Street Maintenance Details**

Street maintenance budget (\$)

Miles of street (miles)

Length of road (miles)

Total Reduced Street Maintenance Costs

\$0.00

**Volunteer Costs**

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Agency:

State: **California**

Point of Contact:

Analyst:

Number of Volunteers Required: 0      Number of Hours Volunteered/Person: 0

Cost of Volunteers Time (\$/Hour/Person): \$0.00      Number of Days Lodging/Volunteer: 0

Per-Person Cost of Lodging for a Volunteer: \$0.00      Cost of Volunteers: \$0.00

**Social Benefits**

**Mental Stress and Anxiety**

**Lost Productivity**

Number of Person: 0      Number of Worker: 0

Treatment Costs per person: \$2,443.00      Productivity Loss per person: \$8,736.00

Total Mental Stress and Anxiety Cost: \$0.00      Total Lost Productivity Cost: \$0.00

**Riverine Elevation and Discharge Data**

Streambed Elevation (ft): 48.2

Flood Profile Number:

Flood Source Name: marsh creek

Elevation At Which Barrier Will Be Overtopped:

FEMA Elevation Certificate Diagram Description:

Other Elevation Source:

Recurrence Interval (yr)	Percent Annual Chance (%)	Elevation Before Mitigation (ft)	Discharge Before Mitigation (cfs)	Elevation After Mitigation (ft)	Discharge After Mitigation (cfs)
10	10.00%	56.50	2,110.0	56.50	2,110.0
50	2.00%	58.00	3,330.0	58.00	3,330.0
100	1.00%	58.70	3,810.0	58.70	3,810.0
500	0.20%	60.00	4,680.0	60.00	4,680.0

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Project Number:

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

**Depth-Damage Functions Using USACE - Galveston: Fire Station**

Building Flood Depth (ft)	Before Mitigation Values:			After Mitigation Values:		
	Before Mitigation (pct)	Before Mitigation User Entered (pct)	Before Mitigation (\$)	After Mitigation (pct)	After Mitigation User Entered (pct)	After Mitigation (\$)
-2.0	0.0%	0.0%	\$0	0.0%	0.0%	\$0
-1.0	0.0%	0.0%	\$0	0.0%	0.0%	\$0
0.0	0.0%	0.0%	\$0	0.0%	0.0%	\$0
1.0	1.0%	0.0%	\$13,050	1.0%	0.0%	\$13,050
2.0	5.0%	0.0%	\$65,250	5.0%	0.0%	\$65,250
3.0	5.0%	0.0%	\$65,250	5.0%	0.0%	\$65,250
4.0	5.0%	0.0%	\$65,250	5.0%	0.0%	\$65,250
5.0	6.0%	0.0%	\$78,300	6.0%	0.0%	\$78,300
6.0	7.0%	0.0%	\$91,350	7.0%	0.0%	\$91,350
7.0	9.0%	0.0%	\$117,450	9.0%	0.0%	\$117,450
8.0	11.0%	0.0%	\$143,550	11.0%	0.0%	\$143,550
9.0	14.0%	0.0%	\$182,700	14.0%	0.0%	\$182,700
10.0	17.0%	0.0%	\$221,850	17.0%	0.0%	\$221,850
11.0	20.0%	0.0%	\$261,000	20.0%	0.0%	\$261,000
12.0	24.0%	0.0%		24.0%	0.0%	
13.0	28.0%	0.0%		28.0%	0.0%	
14.0	32.0%	0.0%	\$417,600	32.0%	0.0%	\$417,600
15.0	36.0%	0.0%	\$469,800	36.0%	0.0%	\$469,800
16.0	41.0%	0.0%	\$535,050	41.0%	0.0%	\$535,050

Total Benefits: **\$464,653**Total Costs: **\$188,654**BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

**Depth-Damage Functions Using USACE - Galveston: Fire Station**

Contents Flood Depth (ft)	Before Mitigation Values:			After Mitigation Values:		
	Before Mitigation (pct)	Before Mitigation User Entered (pct)	Before Mitigation (\$)	After Mitigation (pct)	After Mitigation User Entered (pct)	After Mitigation (\$)
-2.0	0.0%	0.0%		0.0%	0.0%	
-1.0	0.0%	0.0%		0.0%	0.0%	
0.0	0.0%	0.0%		0.0%	0.0%	
1.0	10.0%	0.0%		10.0%	0.0%	
2.0	25.0%	0.0%	\$225,113	25.0%	0.0%	\$225,113
3.0	50.0%	0.0%	\$450,225	50.0%	0.0%	\$450,225
4.0	75.0%	0.0%	\$675,338	75.0%	0.0%	\$675,338
5.0	91.0%	0.0%	\$819,410	91.0%	0.0%	\$819,410
6.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
7.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
8.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
9.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
10.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
11.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
12.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
13.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
14.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
15.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450
16.0	100.0%	0.0%	\$900,450	100.0%	0.0%	\$900,450

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Total Benefits: **\$464,653**

Total Costs: **\$188,654**

BCR: **2.46**

Project Number:

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

**Depth-Damage Functions Using USACE - Galveston: Fire Station**

Displacement Flood Depth (ft)	Before Mitigation Values:			After Mitigation Values:		
	Before Mitigation (Days)	Before Mitigation User Entered (Days)	Before Mitigation (\$)	After Mitigation (Days)	After Mitigation User Entered (Days)	After Mitigation (\$)
-2.0	0.0			0.0		
-1.0	0.0			0.0		
0.0	0.0			0.0		
1.0	45.0			45.0		
2.0	90.0		\$0	90.0		\$0
3.0	135.0		\$0	135.0		\$0
4.0	180.0		\$0	180.0		\$0
5.0	225.0		\$0	225.0		\$0
6.0	270.0		\$0	270.0		\$0
7.0	315.0		\$0	315.0		\$0
8.0	360.0		\$0	360.0		\$0
9.0	405.0		\$0	405.0		\$0
10.0	450.0		\$0	450.0		\$0
11.0	495.0		\$0	495.0		\$0
12.0	540.0		\$0	540.0		\$0
13.0	585.0		\$0	585.0		\$0
14.0	630.0		\$0	630.0		\$0
15.0	675.0		\$0	675.0		\$0
16.0	720.0		\$0	720.0		\$0

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Project: **Marsh Creek Flood Mitigation**

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Total Benefits: **\$464,653**Total Costs: **\$188,654**BCR: **2.46**

Project Number:

Disaster #:

Program:

Agency:

State: **California**

Point of Contact:

Analyst:

**Depth-Damage Functions Using USACE - Galveston: Fire Station**

Loss of Function Flood Depth (ft)	Before Mitigation Values:			After Mitigation Values:		
	Before Mitigation (Days)	Before Mitigation User Entered (Days)	Before Mitigation (\$)	After Mitigation (Days)	After Mitigation User Entered (Days)	After Mitigation (\$)
-2.0	0.0			0.0		
-1.0	0.0			0.0		
0.0	0.0			0.0		
1.0	45.0			45.0		
2.0	90.0		\$5,159,937	90.0		\$5,159,937
3.0	135.0		\$7,739,905	135.0		\$7,739,905
4.0	180.0		\$10,319,873	180.0		\$10,319,873
5.0	225.0		\$12,899,842	225.0		\$12,899,842
6.0	270.0		\$15,479,810	270.0		\$15,479,810
7.0	315.0		\$18,059,778	315.0		\$18,059,778
8.0	360.0		\$20,639,747	360.0		\$20,639,747
9.0	405.0		\$23,219,715	405.0		\$23,219,715
10.0	450.0		\$25,799,684	450.0		\$25,799,684
11.0	495.0		\$28,379,652	495.0		\$28,379,652
12.0	540.0		\$30,959,620	540.0		\$30,959,620
13.0	585.0		\$33,539,589	585.0		\$33,539,589
14.0	630.0		\$36,119,557	630.0		\$36,119,557
15.0	675.0		\$38,699,525	675.0		\$38,699,525
16.0	720.0		\$41,279,494	720.0		\$41,279,494

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Agency:

State: **California**

Point of Contact:

Analyst:

## Other Benefits

### Other Benefits Before Mitigation

No Data

### Other Benefits After Mitigation

No Data

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Program:

Agency:

State: **California**

Point of Contact:

Analyst:

### Loss of Services

#### Fire Station:

Number of People Served by this Fire Station: 40,000

Type of Area Served by this Fire Station: Suburban

Distance in miles between this fire station and the fire station that would provide fire protection for the geographical area normally served by this fire station: 2.00

Fire Station Provide Emergency Medical Services (EMS)? Yes

Distance in miles between this fire station and the fire station that would provide EMS for the geographical area normally served by this fire station? 4.00

### BCR Calculation Results

Expected Annual Damages Before Mitigation

Expected Annual Damages After Mitigation

Expected Avoided Damages After Mitigation (Benefits)

Annual: \$72,768

Present Value: \$848,003

Annual: \$33,054

Present Value: \$385,203

Annual: \$39,714

Present Value: \$462,800

Mitigation Benefits: \$462,800

Mitigation Costs: \$186,654

Benefits Minus Costs: \$276,146

Benefit-Cost Ratio: 2.48

### Cost Estimate

Project Useful Life (years): 25

Construction Type:

Mitigation Project Cost: \$175,000

Detailed Scope of Work: Yes

Annual Project Maintenance Cost: \$1,000

Detailed Estimate for Entire Project: Yes

Final Mitigation Project Cost: \$186,654

Years of Maintenance: 25

Cost Basis Year:

Present Worth of Annual Maintenance Costs: \$11,654

Construction Start Year:

Estimate Reflects Current Prices: No

Construction End Year:

Project Escalation:

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**Justification/Attachments**

Field	Description	Attachments
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